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Korpela

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(54) **HANDHELD SHAKER ASSEMBLY**

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B01F 11/00 (2006.01)
B01F 9/10 (2006.01)

(52) **U.S. Cl.**
CPC . ***B01F 13/00*** (2013.01); ***B01F 9/10*** (2013.01); ***B01F 13/002*** (2013.01); *B01F 2215/005* (2013.01)

(58) **Field of Classification Search**
CPC B01F 13/002; B01F 9/10; B01F 2215/005
USPC 366/212, 213, 218, 130, 129, 110, 113, 366/114, 128, 219, 605; 241/101.2
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,242,218 A * 10/1917 McCann 366/212
2,029,234 A * 1/1936 Helmes 366/209
4,422,768 A 12/1983 Solomon
4,523,855 A 6/1985 Walker
D292,803 S 11/1987 Powell
4,893,938 A 1/1990 Anderson
5,273,357 A 12/1993 Currie
5,399,013 A 3/1995 Sawyer
5,451,105 A 9/1995 Koering
5,971,599 A 10/1999 Bothers
6,612,732 B2 9/2003 Blakeman, II et al.
6,719,451 B1 * 4/2004 Yue 366/130
2011/0024537 A1 * 2/2011 Gonzalez 241/101.2

* cited by examiner

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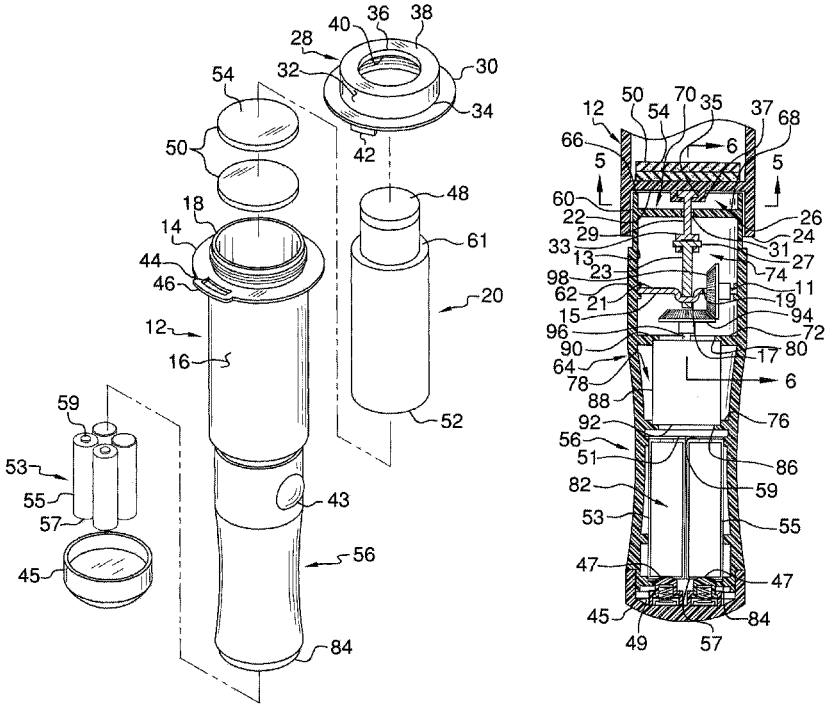
(57) **ABSTRACT**

A handheld shaker assembly for mixing a container of fluid includes a cylindrical holder that may insertably receive the container of fluid. A tubular housing is operationally coupled to the cylindrical holder. A motor is operationally coupled to the tubular housing. A primary gear is operationally coupled to the motor so the motor rotates the primary gear. A secondary gear is operationally coupled to the tubular housing. The secondary gear engages the primary gear so the primary gear rotates the secondary gear. A cam shaft is operationally coupled to the secondary gear so the secondary gear rotates the cam shaft. A first and second linkage are operationally coupled to the cam shaft so the cam shaft moves the first and second linkage. The second linkage engages the cylindrical holder so the second linkage moves the cylindrical holder. An actuator is coupled to the tubular housing to actuate the motor.

1 Claim, 5 Drawing Sheets



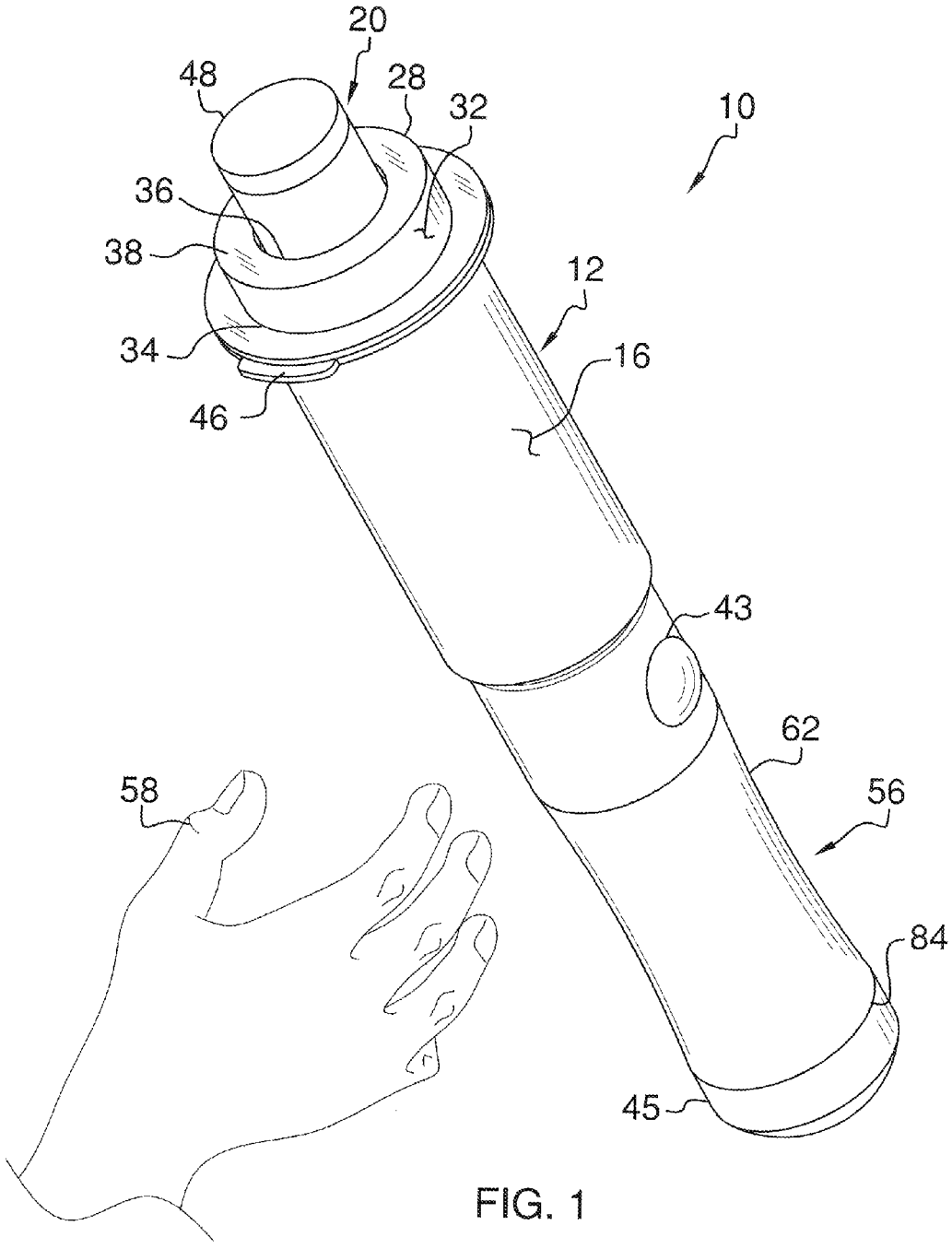


FIG. 1

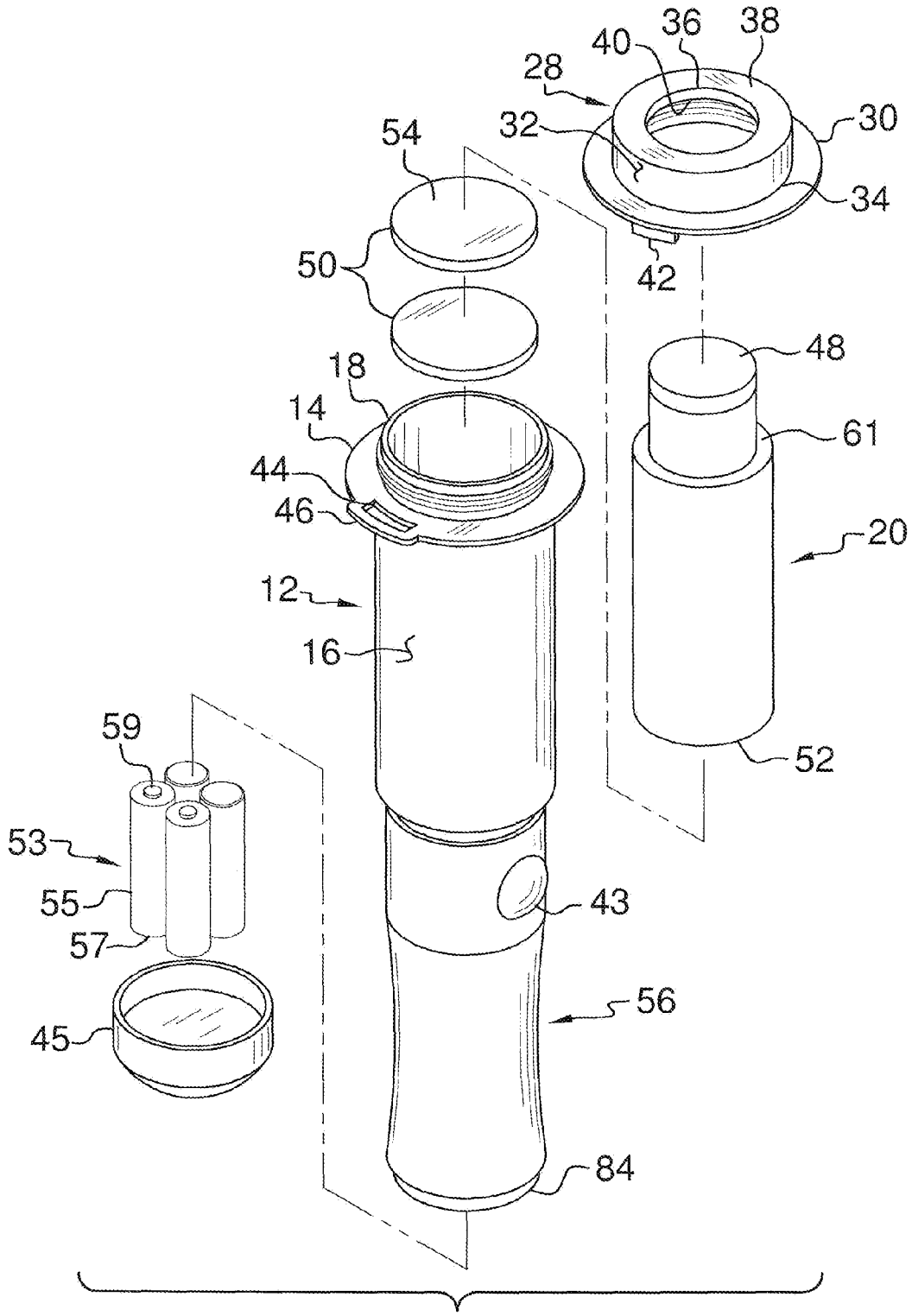

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FIG. 2

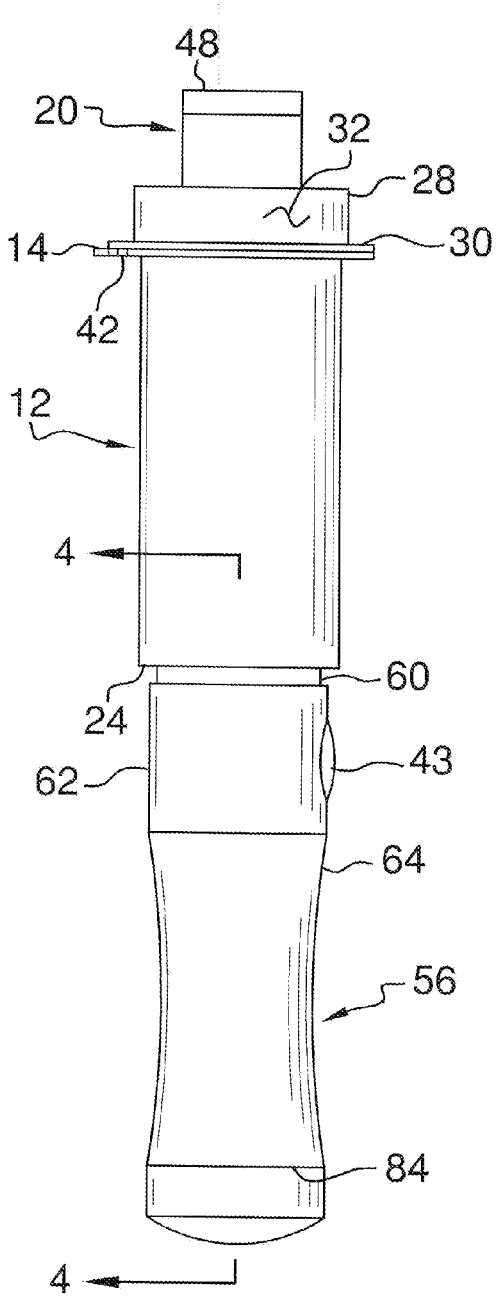
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FIG. 3

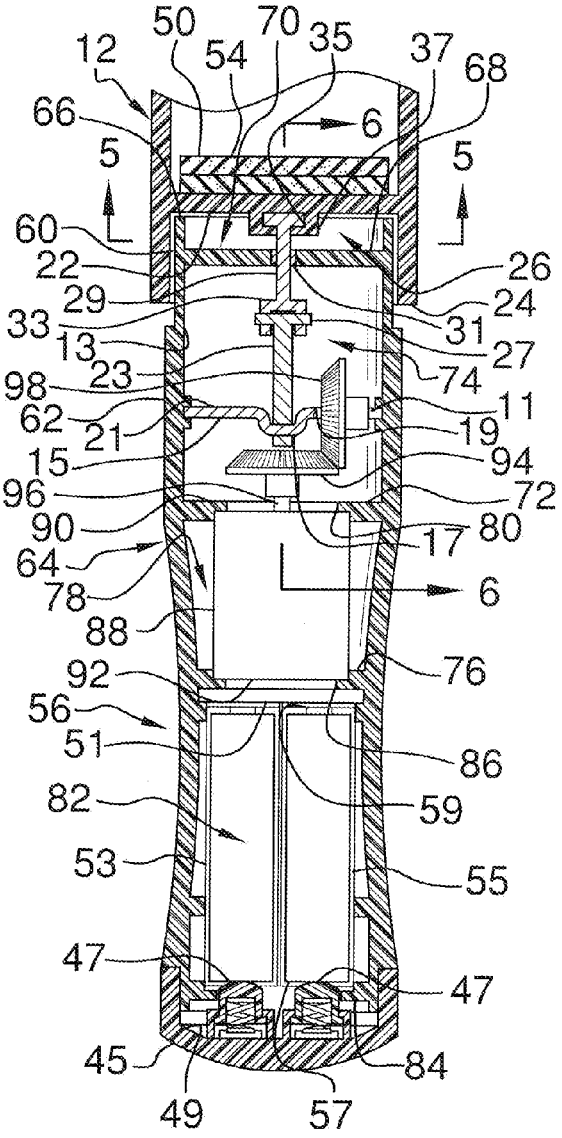
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FIG. 4

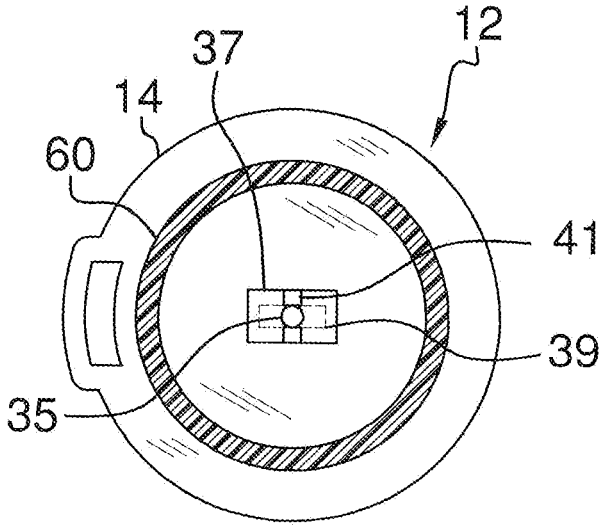
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FIG. 5

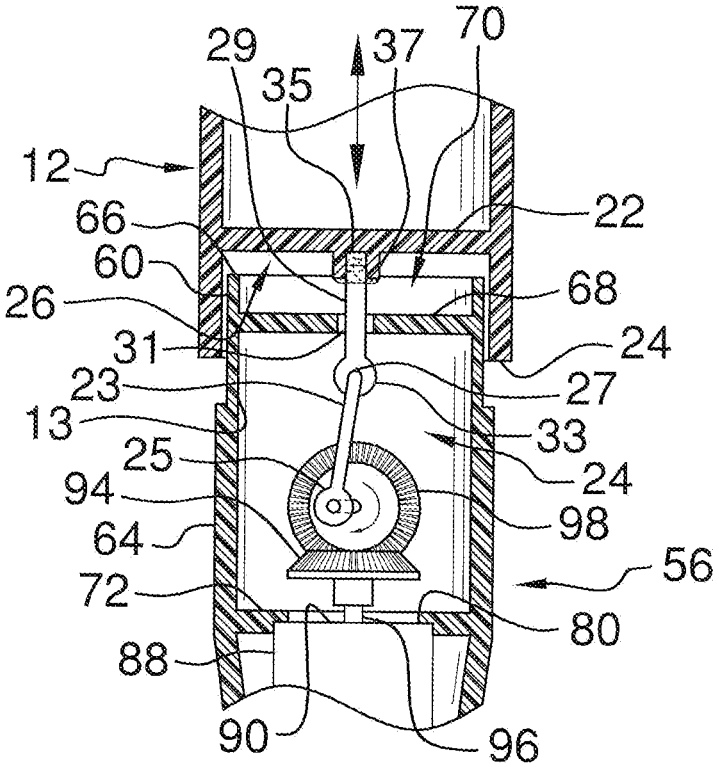
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FIG. 6

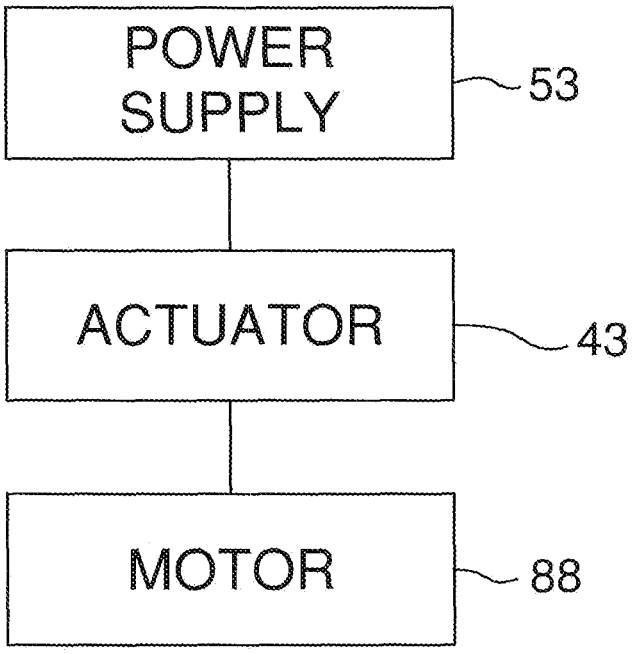

FIG. 7

HANDHELD SHAKER ASSEMBLY

BACKGROUND OF THE DISCLOSURE

Field of the Disclosure

The disclosure relates to handheld shaker devices and more particularly pertains to a new handheld shaker device for mixing a container of fluid.

SUMMARY OF THE DISCLOSURE

An embodiment of the disclosure meets the needs presented above by generally comprising a cylindrical holder that may insertably receive a container of fluid. An upper cap is operationally coupled to the cylindrical holder so the container of fluid is retained in the cylindrical holder. A tubular housing is operationally coupled to the cylindrical holder so the tubular housing may be gripped by a user. A motor is operationally coupled to the tubular housing. A primary gear is operationally coupled to the motor so the motor rotates the primary gear. A secondary gear is operationally coupled to the tubular housing. The secondary gear engages the primary gear so the primary gear rotates the secondary gear. A cam shaft is operationally coupled to the secondary gear so the secondary gear rotates the cam shaft. A first linkage is operationally coupled to the cam shaft so the cam shaft moves the first linkage. A second linkage is operationally coupled to the first linkage so the first linkage moves the second linkage. The second linkage engages the cylindrical holder so the second linkage moves the cylindrical holder. The cylindrical holder mixes the container of fluid. An actuator is coupled to the tubular housing. The actuator is operationally coupled to the motor so the actuator selectively actuates the motor.

There has thus been outlined, rather broadly, the more important features of the disclosure in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are additional features of the disclosure that will be described hereinafter and which will form the subject matter of the claims appended hereto.

The objects of the disclosure, along with the various features of novelty which characterize the disclosure, are pointed out with particularity in the claims annexed to and forming a part of this disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

The disclosure will be better understood and objects other than those set forth above will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIG. **1** is a perspective view of a handheld shaker assembly according to an embodiment of the disclosure.

FIG. **2** is a top perspective view of an embodiment of the disclosure.

FIG. **3** is a right side view of an embodiment of the disclosure.

FIG. **4** is a cross sectional view taken along line **4-4** of FIG. **3** of an embodiment of the disclosure.

FIG. **5** is a cross sectional view taken along line **5-5** of FIG. **4** of an embodiment of the disclosure.

FIG. **6** is a cross sectional view taken along line **6-6** of FIG. **4** of an embodiment of the disclosure.

FIG. **7** is a schematic view of an embodiment of the disclosure.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the drawings, and in particular to FIGS. **1** through **7** thereof, a new handheld shaker device embodying the principles and concepts of an embodiment of the disclosure and generally designated by the reference numeral **10** will be described.

As best illustrated in FIGS. **1** through **7**, the handheld shaker assembly **10** generally comprises a cylindrical holder **12** comprising a first lip **14** coextensively coupled to and extending outwardly from an outer surface **16** of the cylindrical holder **12**. The first lip **14** is positioned proximate an open top end **18** of the cylindrical holder **12** so the cylindrical holder **12** may insertably receive a container of fluid **20**. The fluid may comprise a paint of any conventional design. Additionally, the container of fluid **20** may comprise an aerosol paint container of any conventional design.

The outer surface **16** of the cylindrical holder **12** comprises threads extending between the first lip **14** and the open top end **18** of the cylindrical holder **12**. A bottom wall **22** of the cylindrical holder **12** is positioned upwardly from a bottom edge **24** of the cylindrical holder **12**. A coupling space **26** is defined between the bottom wall **22** and the bottom edge **24** of the cylindrical holder **12**. Moreover, the cylindrical holder **12** may have a length between 7.5 cm and 13 cm and a diameter between 4 cm and 7.5 cm.

An upper cap **28** is provided that comprises a second lip **30** coupled to and extending outwardly from an outer surface **32** of the upper cap **28** proximate a bottom end **34** of the upper cap **28**. A container aperture **36** extends through a top side **38** and a bottom side **40** of the upper cap **28**. Continuing, the upper cap **28** engages the threads on the outer surface **16** of the cylindrical holder **12** so the upper cap **28** is selectively retained on the cylindrical holder **12**. The second lip **30** abuts the first lip **14** when the upper cap **28** is coupled to the cylindrical holder **12**.

A tab **42** extends downwardly from the second lip **30**. Continuing, the tab **42** engages a tab aperture **44** in a locking portion **46** of the first lip **14** when the upper cap **28** is coupled to the cylindrical holder **12**. The upper cap **28** retains the container of fluid **20** in the cylindrical holder **12**. Moreover, a dispensing portion **48** of the container of fluid **20** extends upwardly through the container aperture **36** when the upper cap **28** is coupled to the cylindrical container **20**.

A disk **50** is provided that is selectively positionable within the cylindrical holder **12** so the disk **50** abuts the bottom wall **22** of the cylindrical holder **12**. The disk **50** is one of a plurality of disks **50**. Moreover, a selected number of the plurality of disks **50** is positionable in the cylindrical holder **12** so a bottom **52** of the container of fluid **20** abuts a top **54** of the disk **50**. The selected number of disks **50** allows a variety of heights of containers of fluid **20** to be retained within the cylindrical holder **12** so the container of fluid **20** cannot freely move within the cylindrical holder **12**.

A tubular housing **56** is provided that may be gripped by a user **58**. A top portion **60** of an outer wall **62** of the tubular housing **56** has a thickness that is less than a thickness of a lower portion **64** of the outer wall **62** of the tubular housing **56**. Additionally, the top portion **60** of the outer wall **62** of the tubular housing **56** is insertably positioned within the coupling space **26**. A top edge **66** of the tubular housing **56** is positioned proximate the bottom wall **22** of the cylindrical holder **12**.

A top wall **68** of the tubular housing **56** is spaced downwardly from the top edge **66** of the tubular housing **56**. The top wall **68** of the tubular housing **56** defines an interior of the tubular housing **56**. Moreover, an engaging space **70** is defined between the top wall **68** and the top edge **66** of said tubular housing **56**. The engaging space **70** may have a height between 3 mm and 6.5 mm.

An upper medial wall **72** is positioned within the interior of the tubular housing **56**. Moreover, the upper medial wall **72** is spaced downwardly from the top wall **68** of the tubular housing **56**. A gear space **74** is defined between the upper medial wall **72** and the top wall **68** of the tubular housing **56**. Additionally, the gear space **74** may have a height between 4 cm and 7 cm.

A lower medial wall **76** is positioned within the interior of the tubular housing **56**. Additionally, the lower medial wall **76** of the tubular housing **56** is spaced downwardly from the upper medial wall **72** of the tubular housing **56**. Further, a motor space **78** is defined between the upper **72** and lower **76** medial walls of the tubular housing **56**. An opening **80** extends through the upper medial wall **72** of the tubular housing **56** so the motor space **78** is in fluid communication with the gear space **74**. Finally, the motor space **78** may have a height between 3 cm and 6 cm.

The lower medial wall **76** also defines a power supply space **82** between the lower medial wall **76** and a bottom end **84** of the tubular housing **56**. An opening **86** extends through the lower medial wall **76** so the power supply space **82** is in fluid communication with motor space **78**. Continuing, the power supply space **82** may have a height between 5 cm and 8 cm. The lower portion **64** of the outer wall **62** of the tubular housing **56** has a concavely arcuate portion **66** extending between the upper medial wall **72** and the bottom end **84** of the tubular housing **56**. The user **58** may grip the concavely arcuate portion **66** of the outer wall **62** of the tubular housing **56**.

A motor **88** is coupled to the tubular housing **56** so the motor **88** is positioned within the motor space **78**. The motor **88** extends between the upper **72** and lower **76** medial walls of the tubular housing **56**. A top end **90** of the motor **88** is positioned in the opening **80** in the upper medial wall **72** of the tubular housing **56**, and a bottom end **92** of the motor **88** is positioned in the opening **86** in the lower medial wall **76** of the tubular housing **56**. Lastly, the motor **88** may be an electrical motor of any conventional design with an operational voltage between 3 VDC and 12 VDC.

A primary gear **94** is coupled to a shaft **96** extending between the motor **88** and the primary gear **94** so the motor selectively rotates the primary gear **94**. The primary gear **94** is positioned within the gear space **74** proximate the upper medial wall **72** of the tubular housing **56**. A secondary gear **98** is rotatably coupled to a shaft **11** extending between an inside surface **13** of the outer wall **62** of the tubular housing **56** and the secondary gear **98**. Moreover, the secondary gear **98** is positioned within the gear space **74** such that the secondary gear **98** is oriented at a right angle with respect to the primary gear **94**. The secondary gear **98** engages the primary gear **94** so the primary gear **94** rotates the secondary gear **98**.

A cam shaft **15** is rotatably coupled between the secondary gear **98** and the inside surface **13** of the outer wall **62** of the tubular housing **56** so the secondary gear **98** rotates the cam shaft **15**. The cam shaft **15** is oriented parallel to the top **68** and upper medial **72** walls of the tubular housing **56**. Continuing, a cam portion **17** of the cam shaft **15** is positioned closer to a first end **19** of the cam shaft **15** than a second end **21** of the cam shaft **15** so the cam shaft **15** has a U-shape. The earn shaft **15** and the secondary gear **98** are each positioned proximate the primary gear **94**.

A first linkage **23** is provided. A bottom end **25** of the first linkage **23** is rotatably coupled to the cam portion **17** of the cam shaft **15**. An upper end **27** of the first linkage **23** is urged upwardly and downwardly when the cam shaft **15** is rotated. Moreover, the upper end **27** of the first linkage **23** has have a T-shape. Lastly, the first linkage **23** may have a length between 2 cm and 4 cm.

A second linkage **29** extends through a linkage aperture **31** extending through the top wall **68** of the tubular housing **56**. A U-shaped bottom end **33** of the second linkage **29** is rotatably coupled to the T-shaped upper end **27** of the first linkage **23**. Moreover, a T-shaped upper end **35** of the second linkage **29** is urged upwardly and downwardly when the cam shaft **15** is rotated. The T-shaped upper end **35** of the second linkage **29** engages a retainer **37** that is coupled to the bottom wall **22** of the cylindrical holder **12**.

A groove **39** in the retainer **37** accepts the T-shaped upper end **35** of the second linkage **29**. The T-shaped upper end **35** of the second linkage **29** is rotated into a retaining slot **41** in the retainer **37** so the cylindrical holder **12** is movably coupled to the tubular housing **56**. The cylindrical holder **12** rapidly oscillates upwardly and downwardly when the cam shaft **15** is rotated. The oscillation of the cylindrical holder **12** mixes the container of fluid **20**.

An actuator **43** is coupled to the outer wall **62** of the tubular housing **56** so the actuator **43** is selectively actuatable by the user **58**. Moreover, the actuator **43** is positioned proximate the top portion **60** of the outer wall **62** of the tubular housing **56**. The actuator **43** is electrically coupled to the motor **88** so the actuator **43** selectively actuates and de-actuates the motor **18**. A lower cap **45** is removably coupled to the bottom end **84** of the tubular housing **56**. The lower cap **45** selectively closes the power supply space **82**.

A spring contact **47** is coupled to and extends upwardly from a bottom surface **49** of the lower cap **45**. The spring contact **47** is one of a plurality of spring contacts **47** distributed around the lower cap **45**. Additionally, a flat contact **51** is coupled to the lower medial wall **76** of the tubular housing **56**. The flat contact **51** is electrically coupled between the actuator **43** and the motor **88**.

A power supply **53** is coupled to the tubular housing **56** so the power supply **53** is positioned within the power supply space **82**. The power supply **53** may comprise at least one 3 VDC battery **55**. A negative side **57** of the battery **55** abuts the spring contact **47** so the battery **55** is selectively electrically coupled to the spring contact **47**. A positive side **59** of the battery **55** abuts the flat contact **51** so the battery **55** is selectively electrically coupled to the flat contact **51**. The lower cap **45** retains the power supply **53** in the power supply space **82**.

In use, a selected number of the disks **50** is positioned within the cylindrical holder **12**. The selected number of disks **50** is chosen so a top **61** of the container of fluid **20** abuts the upper cap **28** when the upper cap **28** is positioned on the cylindrical holder **12**. The actuator **43** is actuated so the cylindrical holder **12** oscillates upwardly and downwardly to mix the container of fluid **20**. The user **58** de-actuates the actuator **43** after a selected, duration of time.

With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of an embodiment enabled by the disclosure, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and

described in the specification are intended to be encompassed by an embodiment of the disclosure.

Therefore, the foregoing is considered as illustrative only of the principles of the disclosure. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the disclosure to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the disclosure.

I claim:

1. A handheld shaker assembly for mixing a container of fluid, said assembly comprising:

a cylindrical holder comprising a first lip coextensively coupled to and extending outwardly from an outer surface of said cylindrical holder wherein said first lip is positioned proximate an open top end of said cylindrical holder wherein said cylindrical holder is configured to insertably receive the container of fluid, said outer surface of said cylindrical holder comprising threads extending between said first lip and said open top end of said cylindrical holder, a bottom wall of said cylindrical holder being positioned upwardly from a bottom edge of said cylindrical holder wherein a coupling space is defined between said bottom wall and said bottom edge of said cylindrical holder;

an upper cap comprising a second lip coupled to and extending outwardly from an outer surface of said upper cap proximate a bottom end of said upper cap;

a container aperture extending through a top side and a bottom side of said upper cap, said upper cap engaging said threads on said outer surface of said cylindrical holder wherein said upper cap is selectively retained on said cylindrical holder wherein said upper cap retains the container of fluid in said cylindrical holder;

a tubular housing comprising a top portion of an outer wall of said tubular housing having a thickness being less than a thickness of a lower portion of said outer wall of said tubular housing wherein said top portion of said outer wall of said tubular housing is insertably positioned within said coupling space wherein said tubular housing is configured to be gripped by a user, a top wall of said tubular housing being positioned downwardly from a top edge of said tubular housing wherein an engaging space is defined between said top wall and said top edge of said tubular housing, an upper medial wall of said tubular housing being positioned downwardly from said top wall of said tubular housing wherein a gear space is defined between said upper medial wall and said top wall of said tubular housing, a lower medial wall of said tubular housing being positioned downwardly from said upper medial wall of said tubular housing wherein a motor space is defined between said upper and lower medial walls of said tubular housing, said lower medial wall defining a power supply space between said lower medial wall and a bottom end of said tubular housing;

a motor coupled to said tubular housing wherein said motor is positioned within said motor space such that said motor extends between said central and upper medial walls of said tubular housing;

a primary gear coupled to a shaft extending between said motor and said primary gear wherein said primary gear is positioned within said gear space wherein said motor rotates said primary gear;

a secondary gear rotatably coupled to an inside surface of said outer wall of said tubular housing wherein said secondary gear is positioned within said gear space such that said secondary gear is oriented at a right angle with respect to said primary gear wherein said secondary gear engages said primary gear wherein said primary gear rotates said secondary gear;

a cam shaft rotatably coupled between said secondary gear and said inside surface of said outer wall of said tubular housing wherein said cam shaft is oriented parallel to said top and upper medial walls of said tubular housing;

a first linkage comprising a bottom end of said first linkage rotatably coupled to a cam portion of said cam shaft wherein an upper end of said first linkage is urged upwardly and downwardly when said cam shaft is rotated;

a second linkage extending through a linkage aperture extending through said top wall of said tubular housing wherein a bottom end of said second linkage is rotatably coupled to said upper end of said first linkage wherein an upper end of said second linkage is urged upwardly and downwardly when said cam shaft is rotated operationally coupled to said first linkage wherein said first linkage moves said second linkage, said upper end of said second linkage engaging said bottom wall of said cylindrical holder wherein said cylindrical holder is urged upwardly and downwardly when said cam shaft is rotated wherein said cylindrical holder mixes the container of fluid;

an actuator coupled to said outer wall of said tubular housing wherein said actuator is selectively actuatable by the user, said actuator being electrically coupled to said motor wherein said actuator selectively actuates and de-actuates said motor;

a cap removably coupled to said bottom end of said tubular housing wherein said cap selectively closes said power supply space;

a spring contact coupled to a bottom surface of said cap wherein said spring contact extends upwardly from said bottom surface of said cap, said spring contact being one of a plurality of said spring contacts; and

a power supply coupled to said tubular housing wherein said power supply is positioned within said power supply space, said power supply being electrically coupled to said actuator, said power supply comprising at least one battery.

* * * * *